

CHROMATOGRAPHY OF LIPSTICK

Lab CHROM 5

Adapted from The Center for Applied Research in Education

INTRODUCTION

The colors of lipstick are often due to a mixture of several pigment compounds. These pigments can be separated using paper chromatography. Porous paper serves as the stationary phase. The mobile phase carries the lipstick through the stationary phase and the lipstick separates into individual colored pigments. Depending on the type of pigment, the mobile phase will vary. Lipsticks are soluble in acetone, so acetone serves as the mobile phase. After separation, the chromatogram is complete and illustrates the different pigments that make up a particular color of lipstick.

PURPOSE

The purpose of this experiment is to discover which sample of lipstick was present at the crime scene by comparing chromatograms. The chromatogram that is most similar to the crime scene one will point to the perpetrator of the crime.

EQUIPMENT/MATERIALS

1-250mL beaker	70:30 hexane-acetone
Lipsticks	Beral Pipet labeled HA
chromatography paper	ruler

SAFETY

- Always wear safety glasses and an apron in the lab.
- Wash hands when lab experiment is complete.

Crime Story

Mr. Sternman was a very unpopular man who had managed to make enemies of everyone he knew. Even his own family found him to be an unbearable bully who lied, cheated, and stole from his wife and grown daughter. Mr. Sternman had scheduled a meeting with his new attorney, Ms. Justice, on the afternoon that he was found dead in his apartment.

After being exiled from his home a year ago, Mr. Sternman had moved into a beautiful apartment downtown. Because he was so mean, no one ever visited him. He hated house cleaning and his apartment became a shamble. On the day that his body was found, one scene in the apartment was notable because it was so unusual. The dining room table was laid out with a fresh tablecloth and silver candelabra. Two cups of coffee, two napkins, and a plate of cookies were on the table. One of the napkins contained a smear of lipstick.

In this lab, you will analyze the lipstick on the napkin and compare it with the lipstick of the only three women who were known to have visited Mr. Sternman's apartment: his wife, Mrs. Sternman; his daughter, Miss Sternman; and his attorney, Ms. Justice.

PROCEDURE

1. Obtain one 250mL beaker and a piece of pre-cut chromatography paper with lipstick from the crime scene.
2. With a **pencil** and ruler, draw a line across the short side of the paper under the crime scene sample. At even intervals label the top of the paper with corresponding sample letters.
3. Place a dot of each lipstick sample to be tested along the bottom penciled line matching the labels on the top of the paper with the correct lipstick sample. The dots should be about 0.2 cm in diameter and dark enough to be clearly visible.
4. Using a Beral Pipet dispense approximately 6mLs of 70:30 hexane-acetone (enough to cover the bottom of the beaker) and pour it into the 250mL beaker.
5. Carefully insert the chromatography paper into the beaker, sample end down. The lipstick dots must be above the 70:30 hexane-acetone.
6. Allow the beaker to remain undisturbed for 10 minutes. Remove the chromatograph. Mark the solvent front with a pencil.
7. Measure the distance the 70:30 hexane-acetone moved in cm (the distance from the origin line to the solvent front end). Also measure the distance in cm each component of the lipsticks moved from the origin line. Some lipsticks have only two or three components, and some have more. Enter these measurements on the Data Table.
8. Determine the R_f for each lipstick component of all lipstick samples. Enter those values on the Data Table. To calculate the R_f value, divide the distance traveled by each lipstick component by the distance traveled by the 70:30 hexane-acetone.

$$R_f = \frac{\text{Distance traveled by one lipstick component from the origin (spotting line)}}{\text{Distance the 70:30 hexane-acetone moved from the origin (spotting line)}}$$

Name_____

Name_____

Period_____

Date_____

DATA TABLE $R_f = \frac{\text{Distance traveled by one lipstick component from the origin (column 4)}}{\text{Distance the hexane/acetone moved from the origin (column 2)}}$ **Column 2****Column 4**

Lipstick Samples	Distance Hexane/Acetone Moved In Cm	Colored Components	Distance Lipstick Components Moved	R_f Values
S (crime scene)		1.		
		2.		
		3.		
		4.		
M (Mrs. Sternman)		1.		
		2.		
		3.		
		4.		
W (Ms. Sternman)		1.		
		2.		
		3.		
		4.		
F (Ms. Justice)		1.		
		2.		
		3.		
		4.		